**Claims**

1. A method for producing a peptide having at least one disulfide bridge, comprising the steps of

- providing a nucleic acid molecule encoding a polypeptide comprising a peptide of interest,
- incorporating said nucleic acid molecule into an expression vector as a fusion with an intein,
- expressing the peptide-intein-fusion, and
- inducing the peptide cleavage by temperature and pH change.

2. The method according to claim 1, further comprising the step of

- purifying the peptide by an affinity column.

3. The method according to claim 1, wherein the method is carried out *in vivo* in a host system.

4. The method according to claim 3, wherein the host system comprises *Escherichia coli* cells.

5. The method according to claim 1, wherein the method is carried out *in vitro*.

6. The method according to claim 1, wherein the nucleic acid molecule provided is a synthetic nucleic acid molecule, comprising a nucleotide sequence encoding a peptide of interest, and elements enabling the incorporation of the nucleic acid molecule into an expression vector.

7. The method according to claim 1, wherein the nucleic acid molecule provided is a PCR-amplified nucleic acid molecule originating from a phage display vector.

8. The method according to claim 7, wherein the peptide encoded by the phage display vector contains an amino acid analogue.

9. The method according to claim 7 for preparing any peptide screened by phage display, wherein the nucleic acid molecule provided is a PCR amplicon obtained by using a pair of oligonucleotide primers flanking the nucleotide sequence encoding the peptide of interest, and containing elements required for incorporation of said sequence into an expression vector.

10. The method according to claim 9, wherein the pair of oligonucleotide primers consists of a forward primer having the sequence CCT TTC TGC TCT TCC AAC GCC GAC GGG GCT, and a reverse primer having the sequence ACT TTC AAC CTG CAG TTA CCC AGC GGC CCC.

11. The method according to claim 1 for constructing a library of hydrophilic peptides, wherein the nucleic acid molecule provided further comprises codons for at least one hydrophilic amino acid to be added into the peptide of interest.

12. The method according to claim 11, wherein the peptide GRENYHGCTTHWGFTLC is produced.

13. The method according to claim 1 for constructing a library of hydrophilic peptides, wherein the nucleic acid molecule provided further comprises codons for at least one hydrophilic amino acid for replacing an amino acid non-critical for the activity of the peptide of interest.

14. The method according to claim 1 for producing a pool of peptides, wherein the nucleic acid molecule provided comprises a plurality of nucleotide sequences encoding peptides of interest.

15. The method according to claim 14, comprising a further step of screening the peptide pool obtained for improved solubility properties.

16. The method according to claim 1 for producing a peptide with an unnatural amino acid, wherein the method further comprises the steps of

- providing a host cell auxotrophic for a naturally occurring amino acid to be replaced with said unnatural amino acid,

- expressing the peptide-intein-fusion in said auxotrophic host cell in the presence of an amino acid analogue.

17. The method according to claim 16, wherein the peptide CTTH(5-fluoro-W)GFTLC is produced.

18. The method according to claim 16, wherein the peptide CTTH(6-fluoro-W)GFTLC is produced.

19. The peptide CTTH(5-fluoro-W)GFTLC having improved serum stability.

20. The peptide GRENYHGCTTHWGFTLC having improved solubility in water.

21. The peptide CTTH(5-fluoro-W)GFTLC, which is obtainable according to claim 16.

22. The peptide GRENYHGCTTHWGFTLC, which is obtainable according to claim 11.

23. A method for producing a peptide with an unnatural amino acid, wherein the method comprises the steps of

- expressing a library of peptides containing an amino acid analogue on a phage using an auxotrophic host,
- selecting a peptide of interest containing an amino acid analogue using phage display in an auxotrophic host,
- transferring the nucleic acid encoding said peptide into an intein vector, and
- expressing the peptide of interest according to the method of claim 16.